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Fax Transmission | Date: April 22, 2008

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Company:	USPTO	Our Ref.:	LSI.79US01 (03-1026)
Your Ref:	10/682,149	Fax No.:	(970) 492-1101
Fax No.:	571-270-2062	Phone No.:	(970) 492-1100
Phone No.:	571-270-1062	Total Pages:	9 (Inc. cover sheet)
If Int'l:	N/A	Return Fax To:	N/A

Confirmation Via Mail: Yes

Message:

Please find attached an updated claim listing and remarks per our conversation of earlier today. I took out the extra "and" in claim 1, but since it was part of added text, it does not appear in strikeout language. I also changed the status of claims 3, 10 and 11 to cancelled instead of withdrawn and removed the extra instances of claims 10 and 11. The commas after the word "and" are removed by strikeout as well.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: Yanling Qi et al.

Examiner: Abdou K Seye

Application No.: 10/682,149

Group Art Unit: 2194

Filed: October 8, 2003

Docket: LSI.79US01 (03-1026)

Title: SYSTEM AND METHODOLOGY OF CREATING VIRTUAL DATA PATHS USING
A MULTIPLE-PATH DRIVER

Commissioner for Patents
US Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

PROPOSED EXAMINER'S AMENDMENTS (updated 04/22/2008)

Dear Sir:

In response to phone calls dated April 21 and 22, 2008, please amend the above-identified application via Examiner's Amendment as follows:

AMENDMENTS TO THE CLAIMS are reflected in the listing of claims, which begins on page 2 of this paper.

REMARKS begin on page 7 of this paper.

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This listing of the claims replaces all prior versions, and listings of claims in the application:

LISTING OF THE CLAIMS

1. (currently amended) A method of transmitting computer data between a host computer and at least one computer data storage device where there are multiple physical communications paths between said host computer and said at least one computer data storage device comprising:

inserting a multiple-path driver between driver-stack levels of an operating system operating on said host computer without affecting said operating system operation, said multiple-path driver further being provided without modifying said operating system source code;

inserting a part of said multiple-path driver between middle-level device drivers of said operating system of said host computer and host bus adapter drivers of said operating system of said host computer;

inserting an additional part of said multiple-path driver into said upper-level device drivers of said operating system of said host computer to interface with said middle-level device drivers of said operating system of said host computer;

selectively intercepting device commands from upper-level drivers of said operating system of said host computer;

replacing commands of the upper-level drivers and references to the upper-level function pointers within the operating system with commands and references to the multiple-path driver;

creating a virtual data path between said multiple-path driver and said computer data storage devices;

selectively directing device commands from said multiple-path driver to a virtual host bus adapter driver within said multiple-path driver along said virtual path;

transmitting computer data along more than one physical path of said multiple physical communications paths between said multiple-path driver and said computer data storage devices; and[5]

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selectively presenting said computer data storage devices to said upper-level drivers of said operating system of said host computer as a single virtual computer data storage device.

2. (original) A method of claim 1 further comprising the step of:

utilizing at least one array of computer hard disks as said computer data storage devices.

3-6. (canceled)

7. (currently amended) A system that transmits computer data along more than one physical data path between a host computer and at least one computer data storage device comprising:

a computer operating system that contains a driver stack that transmits commands from said host computer through said operating system to said computer data storage devices;

at least one host bus adapter that connects said computer operating system to said computer data storage devices;

at least one host bus adapter driver that directs said host bus adapters;

a multiple-path driver that transmits data along multiple physical paths between said host computer and said computer data storage devices by intercepting device commands from said computer operating system, replacing commands of said computer operating system with commands of said multiple-path driver and sending said commands of said multiple-path driver to a virtual host bus adapter driver such that said computer data storage devices are selectively presented to said computer operating system of said host computer as a single virtual computer storage device, said multiple-path driver functioning without affecting said computer operating system operation, and said multiple-path driver being provided without modifying said computer operating system source code, a portion of said multiple-path driver being inserted between middle-level device drivers of said computer operating system of said computer and said host bus adapter drivers of said computer operating system of said host computer, an additional

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portion of said multiple-path driver being inserted into said upper-level device drivers of said computer operating system of said host computer to interface with said middle-level device drivers of said computer operating system of said host computer;

selectively presenting said computer data storage devices to said upper-level drivers of said operating system of said host computer as a single virtual computer data storage device

at least one controller that directs said computer data storage devices to acquire or transmit data;

at least one cable that connects said host bus adapters to said controllers of said computer data storage devices; and[.]

a set of buses that connect said controllers to said computer data storage devices and allow said computer data storage devices to acquire or transmit data.

8. (original) The system of claim 7 wherein said computer data storage devices are comprised of arrays of computer hard disks.

9.-11. (canceled)

12. (original) The system of claim 7 wherein said set of cables that connect said host bus adapters to said controllers of said computer data storage devices is electrical.

13. (original) The system of claim 7 wherein said set of cables that connect said host bus adapters to said controllers of said computer data storage devices is fiber-channel.

14. (currently amended) A system that transmits computer data along more than one physical data path between a host computer and computer data storage devices comprising:

a computer operating system that contains a driver stack having three levels of drivers within its driver stack, generally comprising upper-level drivers, middle-level drivers, and host bus adapter drivers that transmits commands from said host computer through said operating system to said computer data storage devices;

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a set of host bus adapters that connects said computer operating system to said computer data storage devices comprised of arrays of computer hard disks;

a set of host bus adapter drivers that directs said host bus adapters;

a multiple-path driver that utilizes multiple paths for data flow between said host computer and said computer data storage devices by intercepting device commands from said computer operating system, replacing commands of said computer operating system with commands of said multiple-path driver and sending said commands of said multiple-path driver to a virtual host bus adapter such that said computer data storage devices are selectively presented to said computer operating system of said host computer as a single virtual computer storage device, said multiple-path driver functioning without affecting said computer operating system operation and said multiple-path driver being provided without modifying said computer operating system source code;

a portion of said multiple-path driver that is inserted between said middle-level device drivers of said computer operating system of said computer and said host bus adapter drivers of said computer operating system of said host computer;

an additional portion of said multiple-path driver that is inserted into said upper-level device drivers of said computer operating system of said computer to interface with said middle-level device drivers of said computer operating system of said host computer;

a set of controllers that direct said computer data storage devices to acquire or transmit data;

a set of cables that connect said host bus adapters to said controllers of said computer data storage devices; and[.]

a set of buses that connect said controllers to said computer data storage devices and allow said computer data storage devices to acquire or transmit data.

15. (original) The system of claim 14 wherein said set of cables that connect said host bus adapters to said controllers of said computer data storage devices is electrical.

16. (original) The system of claim 14 wherein said set of cables that connect said host bus adapters to said controllers of said computer data storage devices is fiber-channel.

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17. (currently amended) A system that transmits computer data along more than one physical data path between a host computer and computer data storage devices comprising:

a means for transmitting commands from said host computer through a computer operating system to said computer data storage devices using multiple paths;

a means for connecting said computer operating system through host bus adapters to said computer data storage devices comprised of arrays of computer hard disks;

a means for directing said host bus adapters with host bus adapter drivers;

a means for utilizing multiple paths for data flow between said host computer and said computer data storage devices by intercepting device commands from said computer operating system, replacing commands of said computer operating system with commands of a multiple-path driver and sending said commands of said multiple-path driver to a virtual host bus adapter driver such that said computer data storage devices are selectively presented to said computer operating system of said host computer as a single virtual computer storage device, said multiple-path driver functioning without affecting said computer operating system operation and said multiple-path driver being provided without modifying said computer operating system source code;

a means for inserting a portion of said multiple-path driver between said middle-level device drivers of said computer operating system of said computer and said host bus adapter drivers of said computer operating system of said host computer;

a means for inserting an additional portion of said multiple-path driver into said upper-level device drivers of said computer operating system of said computer to interface with said middle-level device drivers of said computer operating system of said host computer;

a controller means for directing said computer data storage devices to acquire or transmit data;

a means for connecting said host bus adapters to said computer data storage devices; and[.]

a means for connecting said controller means to said computer data storage devices and allowing said computer data storage devices to acquire or transmit data.

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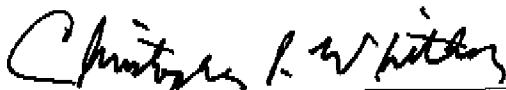
semi-colon. Applicants request that the Examiner enter the above described "matters of form" amendments to claim 14 by Examiner's amendment along with the suggested amendments to claims 1, 7 and 17.

Therefore, claims 1, 7, 14 and 17 contain amendments to claims to enter via Examiner's amendment. Dependent claims 3, 10 and 11 have been withdrawn as the limitations of the claims have been incorporated into the appropriate parent claims. Per the phone conversations with the Examiner on April 21, 2008, entry of the above amendments via Examiner's Amendment places the subject patent application in condition for allowance and such action is earnestly solicited.

Dated this 21st day of April, 2008.

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